Nuclear Instruments and Methods in Physics Research B80/81 (1993) xi–xxvi
North-Holland

Contents

Editorial vii
Committees viii
Industrial Sponsors ix

Part I

Section I. Basic interaction processes

Ia. Ranges, profiles, energy loss

Influence of ionization processes on radiation defect formation
C. Ascheron, J.P. Biersack, P. Goppelt-Langer and J. Erxmeyer 3
Solid effect on the electronic stopping and application to range estimation
S.T. Nakagawa 7
The effect of high charge states on the stopping and ranges of ions in solids
J.P. Biersack 12
Numerical evaluation of the electronic stopping power for heavy ions in solids
Y.-N. Wang and T.-C. Ma 16
Chemical bond effects on the low-energy electronic stopping power of Li and He ions on saturated alcohols, ethers and amines
J. Soullard, S.A. Cruz and R. Cabrera-Trujillo 20
Double scattering in elastic recoil spectra
F. Repplinger, J.P. Stoquert and P. Siffert 24
Computer simulation of channeling implantation at high and medium energies
M. Posselt 28
Energy loss and equilibrium charge distribution of nitrogen ions transmitted through thin silicon crystals
G.G. Bentini, M. Bianconi and R. Nipoti 33
Energy loss and straggling of MeV ^{4}He ions in a Si/Sb multilayer target
D. Niemann, P. Oberschachtsiek, S. Kalbitzer and H.P. Zeindl 37
Electronic stopping of hydrogen ions in graphite and amorphous carbon
V. Nečas, W. Käferböck, W. Rössler and P. Bauer 41
Kinetic approach to multiple scattering of heavy ions in the channeling regime
V.A. Muralev 45
Shell effects observed in exit charge state distributions of 1–30 keV atomic projectiles transiting ultrathin carbon foils
H.O. Funsten, B.L. Barraclough and D.J. McComas 49
Range parameters of Au and Cs implanted into BN and SiC films
P.F.P. Fichtner, M.R. Herberts, P.L. Grande, M. Behar, D. Fink and F.C. Zawislak 53
Channeling effects in high energy ion implantation: Si(N)
M. Berti, G. Brusatin, A. Carnera, A. Gasparotto and R. Fabbri 58
Range measurement of boron isotopes in silicon from 600 keV to 2 MeV
P. Goppelt, J.P. Biersack, B. Gebauer, D. Fink, W. Bohne, M. Wilpert and Th. Wilpert 62
Electronic stopping effects in $Fe_{60}Co_{40}$ films irradiated with high energy ions
J.P. Rivière, J.F. Dinhut, E. Paumier and J. Dural 65

0168-583X/93/$06.00 © 1993 – Elsevier Science Publishers B.V. All rights reserved

Ib. Energy deposition (defects, cascades, mixing, sputtering)

Collision cascades in Zr_3Fe
L.M. Howe, M.H. Rainville, D. Phillips, H. Plattner and J.D. Bonnett 73

Valence and conduction band electronic distributions in ion beam prepared samples
E. Belin, A. Traverse and A. Sonder 80

Radiation-induced disordering and defect production in Cu_3Au and Ni_3Al studied by molecular dynamics simulation
T. Diaz de la Rubia, A. Caro, M. Spaczer, G.A. Janaway, M.W. Guinan and M. Victoria 86

An ion beam mixing model for compound formation: the case of Pd/Si
J. Desimoni and A. Traverse 91

Simulation of ion sputtering of rotating amorphous or polycrystalline solids
S. Wege, M. Bautsch, D. Rübesame, H. Niedrig and T. Wittich 94

On the efficiency of deposited energy density for ion beam mixing processes with ions implanted during and after thin metal film deposition
I.S. Tashlykov, I.M. Belyi, O.G. Bobrovich, S. Kalbitzer, O. Meyer, G.K. Wolf and B. Enders . . 98

Instability of homogeneous distribution of radiation defects in metals in the case of heavily fluctuating defect production
Yu.N. Devyatko, A.A. Makletsov and V.N. Tronin 102

Defect distributions in MeV ion bombarded silicon
A. Hallén and B.G. Svensson 106

Fluence dependent concentration of low-energy Ga implanted in Si
H. Gnaser, J. Steltmann and H. Oechsner 110

Self-organizing processes in metals by low-energy ion beams
I.V. Tereshko, V.I. Khodyrev, V.M. Tereshko, E.A. Lipsky, A.V. Goncharenya and S. Ofori-Sey 115

Ion-beam induced atomic transport at the Sb/Ni interface
F. Shi, Th. Weber, W. Bolse and K.P. Lieb 120

Ion monitoring of ion beam dynamic mixing process
A. Chayahara, M. Kiuchi, Y. Mokuno, Y. Horino, K. Fujii and M. Satou 124

Damage profiles in MgO single crystals after krypton implantation
E. Friedland 128

Giant radiation damage produced by the impact of heavy molecular ions onto silicon single crystal
G.F. Cerofolini, S. Bertoni, L. Meda, R. Balboni, F. Corni, S. Frabboni, G. Ottaviani, R. Tonini and A. Foglio Para 132

A refined model of the interface mixing in local thermal spikes
W. Bolse 137

Investigation of thin films by high-energy ERDA
P. Goppelt, J.P. Biersack, B. Gebauer, D. Fink, W. Bohne, M. Wilpert and Th. Wilpert 142

Time and energy dependent recoil distributions in mixtures
L.W. Brasure and A.K. Prinja 146

The ultimate depth resolution in SIMS profiling: low-energy ion beam mixing of Au–Pt interface
J. Likonen, M. Hautala and I. Koponen 151

Ic. Thermodynamic effects, lattice location

Atomic transport in ion mixed Pd/Co bilayer
K.H. Chae, H.G. Jang, J.H. Song, J.J. Woo, B.S. Choi, K. Jeong and C.N. Whang 159

Ion beam mixing of isotopic silver bilayers by 200 keV germanium
B.V. King, C. Jeynes, R.P. Webb and J.A. Kilner 163

Ion beam mixing of ceramic/metal interfaces
T. Corts, A. Traverse and W. Bolse 167

Computer simulation of point-defect distributions generated by ion implantation
M. Jaraíz, J. Arias, J.E. Rubio, L.A. Bailón and J. Barbolla 172

Lattice location and annealing studies of heavy ion implanted diamond
H. Hofsäss, M. Restle, U. Wahl and E. Recknagel 176
Lattice location of Er in GaAs and $Al_{0.5}Ga_{0.5}As$ layers grown by MBE on (100) GaAs substrates
E. Alves, M.F. da Silva, K.R. Evans, C.R. Jones, A.A. Melo and J.C. Soares 180
Mercury implanted into aluminium: temperature and concentration dependence of the substitutional component
I. Khubeis and O. Meyer 184
Lattice location and migration of lead in iron
J. Jagielski and A. Turos 188
Lattice site occupation of iodine implanted into aluminium
T. Hauser, R. Gerber, G.C. Xiong, B. Strehlau and O. Meyer 192
Lattice location of implanted fluorine in diamond
C.G. Smallman, R.W. Fearick and T.E. Derry 196
β-NMR of ^{12}B in Si: a low-dose implantation study
B. Fischer, W. Seelinger, H.-P. Frank, E. Diehl, K.-H. Ergezinger, B. Ittermann, F. Mai, K. Marbach, S. Weissenmayer, G. Welker, H.-J. Stöckmann and H. Ackermann 201

Section II. Modification of metals

IIa. Mechanical properties, oxidation, corrosion, electrochemical applications

Recent advances in ion beam modification of metals
F.A. Smidt and G.K. Hubler 207
Microscopic characteristics and electrochemical properties of carbon-implanted steels in a non-aqueous acetic acid medium
Y. Ueda, A. Sekiguchi, M. Yuasa, I. Sekine, T. Fujihana, K. Takahashi and M. Iwaki 217
Effect of Mg segregation at grain boundaries on corrosion behavior of intermetallic compound $Ni_3Al(B)$
X. Liu, B. Jian, X. Wang, G. Yang, S. Zou, J. Sun, A. Schroer, W. Ensinger, G.K. Wolf, S. Kalbitzer, K. Takahashi, M. Iwaki and S. Taniguchi 221
Wear resistance of boron nitride coated metal
Y. Andoh, S. Nishiyama, S. Sakai, K. Ogata and F. Fujimoto 225
Study of surface modification of WC–Co alloy by nitrogen implantation
W.D. Shi, X.Y. Wen, J.H. Liu, C.S. Ren, Z.H. Long, G.B. Zhang, Z.X. Gong, Y.N. Wang and T. Zhang 229
Improvement in wear characteristics of steel tools by metal ion implantation
D.M. Rück, D. Boos and I.G. Brown 233
Metallurgical study on hardness distribution by high energy ion implantation taking notice of solid-solubility
K. Higeta, Y. Yoshida, M. Sato, Y. Motonami, M. Kumagai, H. Saito and M. Satou 237
Pulsed ion sources for surface modification of materials
S. Korenev 242
Improvement of rolling contact fatigue life of ion implanted M50 steel
B. Torp, B.R. Nielsen, A. Dodd, J. Kinder, C.M. Rangel, M.F. DaSilva and B. Courage 246
Characteristics of the nitrogen ion implanted intermetallic compound TiAl
X. Wang, Y. Yang, X. Liu, S. Zou, S. Taniguchi, K. Takahashi and M. Iwaki 250
Effects of implantation treatments on micromechanical properties of M2 steel
F. Alonso, J.L. Viviente, J.I. Oñate, B. Torp and B.R. Nielsen 254
Depth profiles of C, N and O on carbon coated steel surfaces made by IBAD
A. Kolitsch, E. Hentschel and E. Richter 258
A comparison of plasma immersion ion implantation with conventional ion implantation
M.J. Kenny, L.S. Wielunski, J. Tendys and G.A. Collins 262

The pitting corrosion behavior of aluminum ion implanted with titanium
X.Y. Yao, C.S. Kumai, T.M. Devine, P.B. Fojas, I.C. Ivanov, K.-M. Yu and I.G. Brown 267
Improvement of physical and chemical properties of steel implanted with Cr^+, Ti^+, Si^+ ions
I.S. Tashlykov, I.M. Belyi, O.G. Bobrovich, V.V. Tuljev, M.G. Shadruchin, V.I. Kolotyrkin, M.Yu. Tomashpolskii and V.S. Kulikauskas 271
Electrochemical absorption of hydrogen into N^+, O^+ and Ar^+ implanted palladium electrodes
K. Takahashi, M. Ueshima and M. Iwaki 275
Electrochemical behavior of titanium implanted with nickel and tantalum ions
Y. Sugizaki, T. Yasunaga and H. Satoh 279
Aqueous corrosion of ion beam mixed Ta films on 13% chromium steel
N.K. Huang 285
High temperature oxidation of ion implanted 2011 aluminium alloy
J.W. Chu, N. Dytlewski, P.J. Evans and D.K. Sood 289
Ion implantation of Raney copper catalysts
S. Durbach, J. Mellor, N.J. Coville and T.E. Derry 294
The effects of Ti implantation on corrosion and adhesion of TiN coated stainless steel
K. Baba, S. Nagata, R. Hatada, T. Daikoku and M. Hasaka 297

IIb. Implantation-induced phase formation

Phase formation in iron after high-fluence ion implantation
B. Rauschenbach 303
CEMS study of ^{57}Fe implantation in nickel
G. Marest, J. Parellada, G. Principi and C. Tosello 309
Modification of the thermal behavior of iron-carbonitrides induced by Kr bombardment on nitrogen-implanted low carbon steel
C.E. Foerster, L. Amaral, N. Moncoffre and M. Behar 313
Evolution of lead precipitates in ion implanted aluminium
K.K. Bourdelle, A. Johansen, B. Schmidt, H.H. Andersen, E. Johnson, L. Sarholt-Kristensen, S. Steenstrup and L. Yu 317
Investigation of buried AlN layers formed by nitrogen implantation into Al
C. Lin, Y. Li, J.A. Kilner, R.J. Chater, J. Li, A. Nejim, J.P. Zhang and P.L.F. Hemment 323
Enhanced stability of nitrides in α-Fe co-implanted with Cr + N or Al + N
M. Kopcewicz, J. Jagielski, A. Turos and G. Gawlik 327
Formation of metastable carbide and fractal structure in Co thin films by carbon ion implantation
B.X. Liu and K. Tao 332
Characteristics of tool steel implanted with multi-energy B^+ and single-energy N_2^+ ions
S. Ohtani, Y. Mizutani and T. Takagi 336
Microstructure and tribology of nitrogen implanted molybdenum and tungsten
L. Palmetshofer and P. Rödhammer 340
Introduction of nitrogen into metals by high intensity pulsed ion beams
J. Piekoszewski, J. Langner, J. Białoskórski, B. Kozłowska, C. Pochrybniak, Z. Werner, M. Kopcewicz, L. Waliś and A. Ciurapiński 344
High dose implantation of aluminium into iron
H. Reuther, O. Nikolov, S. Kruijer, R.A. Brand and W. Keune 348
An investigation of phase formation by high dose silicon ion implantation into nickel
Z. Rao, J.S. Williams, A.P. Pogany and D.K. Sood 352
Aggregation of iron implants in silver
G. Marest, H. Jaffrezic, J. Stanek and H. Bińczycka 357

IIc. Ion beam mixing and amorphization of metals

The prediction of phases in ion beam mixed multilayers
I.J.R. Baumvol 363

Amorphization of metallic alloys by ion bombardment
P. Ziemann, W. Miehle and A. Plewnia 370
Amorphous and quasicrystalline AlMn and AlFe phase synthesis by ion beam mixing and related transport properties
J.C. Plenet, A. Perez, J. Rivory and O. Laborde 379
In situ TEM study of ion induced amorphization at low temperature in Al_3Ti
C. Jaouen, M.F. Denanot, J.P. Rivière, M.O. Ruault and M. Salomé 386
On the phase formation during ion beam mixing of Al–Ti
K. Kyllesbech Larsen, S. Skovmand, N. Karpe, J. Bøttiger and R. Bormann 390
Ion beam mixing of TiC/Fe bilayers
P. Gesan, J. Delafond, M. Cahoreau, J.P. Eymery and H. Garem 394
The effect of pre- and postimplantation of carbon on the phase formation and surface mechanical properties of an ion beam mixed Fe–Ti multilayered system
J.-P. Hirvonen, M. Nastasi, T.R. Jervis and T.G. Zocco 398
X-ray diffraction study of residual stress modification in Cu/W superlattices irradiated by light and heavy ions
K.F. Badawi, Ph. Goudeau, J. Pacaud, C. Jaouen, J. Delafond, A. Naudon and G. Gladyszewski 404
β phase formation and dissolution under ion irradiation in Cu/Pd thin films
Z. Quan, V. Naundorf, M.-P. Macht and H. Wollenberger 408
Diffusion-induced grain boundary migration during ion beam mixing of Au/Cu bilayers
D.E. Alexander, P.M. Baldo and L.E. Rehn 412
Mixing effect of Fe/Ni multilayers of overall $Fe_{65}Ni_{35}$ composition
C. Tosello, F. Ferrari, R. Brand, W. Keune, G. Marest, M.A. El Khakani, J. Parellada, G. Principi, S. Lo Russo, V. Rigato and S. Enzo 417
Construction of free energy diagram and phase formation by ion mixing in the Ni–Nb system
H.Y. Bai, Z.J. Zhang and B.X. Liu 421
Amorphization of In/Au-bilayers by low temperature ion beam mixing
W. Miehle, A. Plewnia and P. Ziemann 424
Effect of ion beam irradiation in amorphous ferromagnetic alloys
N. Matsumoto, Lu Bang, H. Maeta, J.P. Jakubovics, K. Haruna and F. Ono 428
Surface composition changes of CuBe alloys under Ar^+ ion bombardment studied by Auger electron spectroscopy
A.V. Shopov, R.G. Vichev and D.S. Karpuzov 432
Ion beam mixing of Fe/Al multilayers: a CEMS study
J.L. Alexandre, M.A.Z. Vasconcellos, R. Hübler, S.R. Teixeira and I.J.R. Baumvol 436

IId. Low-energy implantation, ion plating, defects and diffusion

A comparison of IBAD films for wear and corrosion protection with other PVD coatings
W. Ensinger, A. Schröer and G.K. Wolf 445
RBS and channeling study of the correlation between ion beam mixing and amorphization in a binary metal system
T. Benkoulal, J. Jagielski, L. Thomé, B. Vassent and M. Kopcewicz 455
Low energy ^{15}N and ^{14}N implantation in chromium analysed by NRA and RBS
M. Rose, H. Baumann, A. Markwitz and K. Bethge 459
Properties of carbon nitride thin films prepared by ion and vapor deposition
J.F.D. Chubaci, T. Sakai, T. Yamamoto, K. Ogata, A. Ebe and F. Fujimoto 463
Corrosion stability of TiN prepared by ion implantation and PVD
N. Heide and J.W. Schultze 467
Hydride formation in zirconium and titanium as a result of low energy ion bombardment
J.A. Jackman, G.J.C. Carpenter and J. McCaffrey 472
Defect formation and defect–impurity interaction in the hexagonal transition metals Re and Lu
H. Koch and R. Vianden 476

Behavior of nitrogen implanted into Zr at high fluence
S. Miyagawa, M. Ikeyama, K. Saitoh, S. Nakao, Y. Sakai and Y. Miyagawa 480
High dose carbon implantation in nickel
Z.H. Zhang, L. Chow, Y.K. Tao, K.D. Paschke and W.K. Chu 485
Phase transformations in Mo under simultaneous implantation of metal and gas ions
A.N. Tyumentsev, Yu.P. Pinzhin, A.D. Korotaev, A.E. Behert, A.O. Savchenko, Yu.R. Kolobov, S.P. Bugaev, P.M. Schanin and Y.Yu. Yushkov 491
Evolution of profiles of implanted nitrogen in metal bilayers
K.K. Bourdelle and D.O. Boerma 496
High dose implantation of yttrium and barium ions into copper: the use of a sacrificial carbon layer for enhanced retention
L. Clapham, J.L. Whitton and D. Rück 501

Section III. Modification of semiconductors

IIIa. Radiation damage

MeV implantation into semiconductors
J.S. Williams, R.G. Elliman, M.C. Ridgway, C. Jagadish, S.L. Ellingboe, R. Goldberg, M. Petravic, W.C. Wong, Z. Dezhang, E. Nygren and B.G. Svensson 507
Mechanisms of amorphization in ion implanted crystalline silicon
S.U. Campisano, S. Coffa, V. Raineri, F. Priolo and E. Rimini 514
Channeling and TEM investigations of pulse electron beam annealed GaAs implanted with Pb
H.W. Alberts, H.L. Gaigher and L.J. Bredell 519
The displacement damage produced in Si by 590 MeV protons
M. Alurralde, F. Paschoud, M. Victoria and D. Gavillet 523
Annealing of defects created in silicon by MeV ion implantation
L. Sealy, R.C. Barklie, W.L. Brown and D.C. Jacobson 528
Ion implantation damage and annealing in GaSb
R. Callec, A. Poudoulec, M. Salvi, H. L'Haridon, P.N. Favennec and M. Gauneau 532
Dose rate dependence of the ion-beam-induced epitaxial crystallization in silicon
V. Heera, R. Kögler, W. Skorupa and R. Grötzschel 538
Swelling of GaSb at low energies (1.3–14.5 keV)
M. Gauneau, R. Chaplain, A. Rupert, Y. Toudic, D. Riviere and R. Callec 543
The effect of defects caused by Xe ion bombardment on the structure of Au/GaAs contacts
E. Jároli, J. Gyulai, B. Pécz, R. Veresegyházy, G. Radnóczi and P.B. Barna 548
Strain distribution in As^+ and Sb^+ ion implanted and annealed ⟨100⟩ Si
Z.E. Horvath, G. Peto, E. Zsoldos and J. Gyulai 552
Reduced reverse temperature of ion beam induced amorphization/crystallization for intermittent beam irradiation of silicon?
R. Kögler, V. Heera, W. Skorupa, E. Glaser, T. Bachmann and D. Rück 556
Dynamics of void formation during implantation of Si under self-annealing conditions and their influence on dopant distribution
G. Lulli, P.G. Merli, A. Migliori, G. Brusatin and A.V. Drigo 559
In situ detection of rearrangement processes during electron beam annealing of ion implanted InP
C. Maurer, R. Kallweit, H. Baumann, K. Bethge and E.F. Krimmel 564
Distribution of strain in Ge ion implanted silicon measured by high resolution X-ray diffraction
A. Pesek, P. Kastler, K. Lischka and L. Palmetshofer 569
Defect levels in silicon bombarded with light ions
J. Reisinger and L. Palmetshofer 573
Pulsed UV laser irradiation effect for Sn^+-implanted GaAs
H. Shibata, Y. Makita, T. Ikeda, M. Hasegawa, A. Yamada, S. Niki, T. Iida and S. Uekusa . . . 578

Generation rate of point defects in silicon irradiated by MeV ions
B.G. Svensson, C. Jagadish and J.S. Williams 583
Near-surface defects formed by MeV ion implantation into silicon
H. Sayama, A. Kinomura, Y. Yuba and M. Takai 587
Annealing behavior of damage in Si-implanted InP studied by piezoelectric detection of photo-acoustic signal
H. Yoshinaga, J. Kawai, T. Agui, F. Uehara and T. Matsumori 591
The kinetics of self ion amorphization of silicon
R.D. Goldberg, R.G. Elliman and J.S. Williams 596

IIIb. Defect properties

Conductivity changes and impurity–defect interactions in ion-implanted amorphous silicon
S. Coffa, F. Priolo, J.M. Poate and S.H. Glarum 603
Photon assisted implantation (PAI)
L.P. Biró, J. Gyulai, H. Ryssel, L. Frey, T. Kormány, N.M. Tuan and Z.E. Horváth 607
Analysis of the SiO_2 defects originated by phosphorus implantation in MOS structures
S.A. Bota, J. Montserrat, A. Pérez-Rodríguez and J.R. Morante 612
Optical investigation of implantation damage in GaAs/AlGaAs quantum wells
A. Kieslich, J. Straka, A. Forchel and N.G. Stoffel 616
Paramagnetic defects in silicon irradiated with 40 MeV As ions
A.V. Dvurechenskii, A.A. Karanovich, A.V. Rybin and R. Grötzschel 620
X-ray diffraction analysis of damage accumulation due to the nuclear energy loss of 50 keV and 1–2.2 MeV B ions implanted in silicon
R. Fabbri, G. Lulli, R. Nipoti and M. Servidori 624
TEM study of Si^+, Ge^+ and C^+ implanted silicon
Y. Kikuchi, M. Kase, M. Kimura and M. Yoshida 628
Electrical and optical characterization of defect levels caused in InGaAs by boron ion implantation
S. Yamamura, T. Kimura, S. Yugo, R. Saito, M. Murata and T. Kamiya 632
Disorder in high-dose, high-energy O- and Si-implanted Si
S.L. Ellingboe and M.C. Ridgway 636
Gold and platinum accumulation on buried defects in silicon
P. Rohr, J.J. Grob and P. Siffert 640
Incorporation of In into Si preamorphized with Si, Ge and Sn
R. Vianden, R. Gwilliam and B. Sealy 644
Damage distribution in GaAs implanted at elevated temperature
M. Kalitzova, D. Karpuzov, N. Pashov, G. Vitali, M. Rossi and R. Scholz 647

IIIc. Transport and optical phenomena

Optical doping of silicon with erbium by ion implantation
A. Polman, J.S. Custer, E. Snoeks and G.N. van den Hoven 653
High energy implantation of ^{10}B and ^{11}B into (100) silicon in channel and in random direction
S. Bogen, L. Gong, L. Frey and H. Ryssel 659
Radiation defects passivation by neutron irradiation of hydrogen-implanted silicon
V.V. Bolotov, V.M. Emeksuzyan, G.L. Plotnikov and E.N. Vologdin 663
Negative differential resistance in proton-beam modified silicon
V.V. Bolotov, V.M. Emeksuzyan, G.L. Plotnikov and E.N. Vologdin 667
The activation energy of electrical conduction of ion beam mixed Sb/n-Si Schottky contacts
J.B. Malherbe, K.P. Weimer, E. Friedland and L.J. Bredell 670
Codoping effects of As and Xe on ion-beam-induced epitaxial crystallization of Si
M. Hasegawa, N. Kobayashi and N. Hayashi 674

An explanation of transient-enhanced diffusion and electrical activation of boron in crystalline silicon during postimplantation annealing
H.U. Jäger 679
Ion implantation of zirconium and hafnium in InP and GaAs
A. Knecht, M. Kuttler, H. Scheffler, T. Wolf, D. Bimberg and H. Kräutle 683
Formation and characterization of shallow junctions by through-film ion implantation in GaAs
H.L. Shen, H.L. Xu, G.Q. Xia, S.C. Zou, Z.Y. Zhou, B.Y. Jiang and X.H. Liu 687
Properties of Mn^+-implanted GaAs
S. Niki, Y. Makita, A. Yamada, T. Iida, A. Obara, H. Tanoue, T. Kitahara, K. Aoki and N. Kutsuwada 691
Ion implanted arsenic in silicon
A. Nylandsted Larsen, B. Christensen, P.H. Christensen and S.Yu. Shiryaev 697
Structural characterisation of nitrogen ion implantation into silicon for sensor technology
A. Romano-Rodríguez, A. El-Hassani, J. Samitier, A. Pérez-Rodríguez, S. Martínez, J.R. Morante, J. Esteve and J. Montserrat 702
Structural and optical characterization of implanted and annealed semi-insulating GaAs
Y.B. Trudeau, R. Arès, G.E. Kajrys, G. Gagnon, J.L. Brebner and M. Jouanne 706
Defect production, annealing and electrical activation in Si^+ implanted InP
E. Wendler, P. Müller, T. Bachmann and W. Wesch 711
High energy ion implantation in GaAs
W. Wesch and E. Wendler 716
Low temperature recrystallization of ion implanted InP
P. Müller, W. Wesch, V.S. Solovyev, P.I. Gaiduk, E. Wendler, F.F. Komarov and G. Götz 721

Part II

IIId. Phases, layers and structures

Implantation induced changes in quantum well structures
R. Kalish, L.C. Feldman, D.C. Jacobson, B.E. Weir, J.L. Merz, L.-Y. Kramer, K. Doughty, S. Stone and K.-K. Lau 729
Intermixing of MeV ion-implanted and annealed AlGaAs/GaAs superlattices
M. Tamura, A. Hashimoto and T. Saito 734
Ion bombardment of SiO_2/Si and Si measured by in situ X-ray reflectivity
E. Chason, T.M. Mayer, D. McIlroy and C.M. Matzke 742
Comparison of the effects of ion implantation induced interdiffusion in GaAs/AlGaAs and InGaAs/GaAs single quantum wells
I.V. Bradley, W.P. Gillin, K.P. Homewood and R. Grey 747
Regrowth and strain recovery of Sb implanted $Si_{1-x}Ge_x$ strained layers
Z. Atzmon, M. Eizenberg, E. Zolotoyabko, S.Q. Hong, J.W. Mayer and F. Schäffler 751
Ion-beam-induced simultaneous epitaxial growth of α- and cubic $FeSi_2$ in Si (100) at 320°C
J. Desimoni, M. Behar, H. Bernas, X.W. Lin, Z. Liliental-Weber and J. Washburn 755
Influence of impurities on ion beam induced $TiSi_2$ formation
C. Dehm, B. Raum, I. Kasko and H. Ryssel 759
Ion beam synthesis of buried $CrSi_2$ layers
Chr. Dudda, S. Mantl, Ch. Dieker, M. Dolle and H. Lüth 764
The fabrication of epitaxial Ge_xSi_{1-x} layers by ion implantation
R.G. Elliman and W.C. Wong 768
Ion implantation and annealing of Fe for semi-insulating layers formation in InP
A. Gasparotto, A. Carnera, G. Arzenton, M. Tromby, S. Pellegrino, F. Vidimari and M. Caldironi 773
Formation of relaxed $Si_{1-x}Ge_x$ layers on SIMOX by high-dose ^{74}Ge ion implantation
B. Holländer, S. Mantl, W. Michelsen and S. Mesters 777

A comparison of shallow and deep iron silicide layers fabricated by ion beam synthesis
T.D. Hunt, K.J. Reeson, R.M. Gwilliam, K.P. Homewood, R.J. Wilson, B.J. Sealy, C.D. Meekison, G.R. Booker and P. Oberschachtsiek 781

Effect of ion-beam mixing temperature on cobalt silicide formation
I. Kasko, C. Dehm, L. Frey and H. Ryssel 786

Low-energy ion-beam-induced epitaxial crystallization of GaAs
N. Kobayashi, M. Hasegawa and N. Hayashi 790

On the ion beam synthesis of GaAsSb alloys
A. Kozanecki and R. Groetzschel 795

X-ray and channeling analysis of ion implanted gallium arsenide
A. Kozanecki, B.J. Sealy, R. Gwilliam and P. Kidd 798

High-dose implantations of Al into Si(111) and Si(100)
R.S. Daley and R.G. Musket 802

High-energy high-dose Ni irradiation of SOI structures
J.K.N. Lindner, P. Kersten, E.H. te Kaat and S. Henke 807

Thin buried oxide in implanted silicon
L. Meda, S. Bertoni, G.F. Cerofolini and C. Spaggiari 813

Epitaxial metal island formation on Si(111) by cluster deposition from a beam
P. Jonk, R. Hector, F. Wittenberg and K.H. Meiwes-Broer 818

Direct formation of device worthy thin film SIMOX structures by low energy oxygen implantation
A. Nejim, Y. Li, C.D. Marsh, P.L.F. Hemment, R.J. Chater, J.A. Kilner and G.R. Booker 822

Reduction of lateral ion straggling for the fabrication of intermixed GaAs/AlGaAs quantum wires
F.E. Prins, G. Lehr, M. Burkard, H. Schweizer and G.W. Smith 827

Growth and electrical properties of ion implanted $FeSi_2$ on (111)Si
K. Radermacher, S. Mantl, D. Gerthsen, Ch. Dieker and H. Lüth 831

MeV In-ion implantation for electrical isolation of p^+-InP
M.C. Ridgway, R.G. Elliman and N. Hauser 835

Buried oxide layers formed by oxygen implantation on screened oxide silicon wafers: structural analysis
J. Samitier, S. Martinez, A. Pérez-Rodríguez, B. Garrido, J.R. Morante, A.M. Papon and J. Margail 838

Residual stress during local SIMOX process: Raman measurement and simulation
A. Seidl, M. Takai, H. Sayama, K. Haramura, H. Ryssel, R. Schork and K. Kato 842

High-dose mixed Ga/As and Ga/P ion implantations in silicon single crystals
S.Yu. Shiryaev and A. Nylandsted Larsen 846

Segregation of dopants in ion beam synthesised $CoSi_2$ layers
K.J. Reeson, T.D. Hunt, R.M. Gwilliam, B.J. Sealy, R.S. Spraggs, C.D. Meekison and G.R. Booker 851

Concentration profiles of high dose MeV oxygen implanted silicon
K. Touhouche, J. Jackman and A. Yelon 857

Precipitation kinetics in silicon during ion beam synthesis of buried silicide layers
H. Trinkaus and S. Mantl 862

Ion beam synthesis of ternary $(Fe_{1-x}Co_x)Si_2$
E. Wieser, D. Panknin, W. Skorupa, G. Querner, W. Henrion and J. Albrecht 867

Production and in-situ analysis of microscale oxide structures in silicon by oxygen implantation
K. Wittmaack 872

Effect of the incidence geometry on the ion induced Ni-silicides surface compositional modifications
R. Verucchi, C. Scorzoni and S. Valeri 877

Interface structure during ion-beam-induced epitaxial crystallization of silicon
J.S. Custer, A. Battaglia, M. Saggio and F. Priolo 881

IIIe. Compound systems

Ion implantation effects in silicon carbide
C.J. McHargue and J.M. Williams 889
Ion beam synthesis of buried metallic and semiconducting silicides
S. Mantl 895
Lattice damage in ion implanted silicon–germanium alloys
T.E. Haynes and O.W. Holland 901
Ion beam synthesis of $CoSi_2$ in $Si_{1-x}Ge_x$ alloy layers with different Ge concentrations
A. Lauwers, K. Maex, J. Vanhellemont, M. Caymax, J. Poortmans and M. Van Rossum 906
Ion implantation of isoelectronic impurities into InP
A. Yamada, Y. Makita, K.M. Mayer, T. Iida, H. Yoshinaga, S. Kimura, S. Niki, H. Shibata, S. Uekusa and T. Matsumori 910
Influence of Al and P doping on optical and electrical properties of ion beam synthesized SiC
A. Battaglia, G. Derst and S. Kalbitzer 915
Ion implantation and rapid thermal annealing of Au–$Cd_xHg_{1-x}Te$ structures
N.N. Gerasimenko, A.A. Nesterov and V.V. Vasil'ev 919
Redistribution of magnesium in InAs during post-implantation annealing
N.N. Gerasimenko, A.M. Myasnikov, V.I. Obodnikov and L.N. Safronov 924
Ion implantation doping of polycrystalline SiC thin films prepared by PECVD
G. Krötz, W. Hellmich, G. Müller, G. Derst and S. Kalbitzer 927
Composition changes in Ar^+ and e^--bombarded SiC: an attempt to distinguish ballistic and chemically guided effects
A. Miotello, L. Calliari, R. Kelly, N. Laidani, M. Bonelli and L. Guzman 931
Disorder creation and annealing in Hg implanted CdTe
A. Traverse, G. Leo, J.G. Alves, P.M. Almeida, M.F. Da Silva and J.C. Soares 938
Polytype transitions in ion implanted silicon carbide
J. Pezoldt, A.A. Kalnin, D.R. Moskwina and W.D. Savelyev 943
Thermal stability of $Si/CoSi_2$ multiple layer systems
S. Schippel, A. Witzmann and J.K.N. Lindner 949

IIIf. Amorphous systems, modelling and special effects

The contribution of ion-beam techniques to the physics and technology of amorphous semiconductors
G. Müller 957
Environments of ion-implanted dopants in amorphous silicon at various stages of annealing
G.N. Greaves, A.J. Dent, B.R. Dobson, S. Kalbitzer and G. Müller 966
In situ analysis of irradiation-induced crystal nucleation in amorphous silicon: a "microscope" for thermodynamic processes in nucleation
J.H. Shin and H.A. Atwater 973
Properties of fully implanted amorphous Si_xC_{1-x}:H alloys
G. Compagnini, L. Calcagno and G. Foti 978
Structural relaxation in amorphous silicon prepared by ion implantation
Y. Hiroyama, T. Motooka, T. Tokuyama, L. Wei and S. Tanigawa 982
Recrystallization of In and P implanted InP
P. Kringhøj and S.Yu. Shiryaev 986
Enhanced solid phase epitaxial recrystallization of amorphous silicon due to nickel silicide precipitation resulting from ion implantation and annealing
A.Yu. Kuznetsov, I.I. Khodos, V.N. Mordkovich, A.F. Vyatkin and N.G. Chichenin 990
Ion-beam-induced epitaxy in B-implanted silicon preamorphized with Ge ions
K. Kuriyama, H. Takahashi, K. Shimoyama, N. Hayashi, M. Hasegawa and N. Kobayashi 994

Theory of diffusion processes in implanted silicon
E. Antoncik 998
Studies of reactive ion etching using Colutron hot filament dc plasma ion sources
I. Bello, W.H. Chang, X.H. Feng and W.M. Lau 1002
Study of ion-beam-induced epitaxy in Si by slow positron annihilation and RBS channeling
N. Hayashi, R. Suzuki, H. Watanabe, I. Sakamoto, N. Kobayashi, T. Mikado, T. Yamazaki and K. Kuriyama 1006
Dry and wet etching properties of thermally grown silicon dioxide layer after N^+ ion implantation and annealing
K. Kudo, S. Kuniyoshi and K. Tanaka 1010
X-ray diffraction, Rutherford backscattering and channeling measurements on Pb inclusions in Si
K. Milants, P. Hendrickx and H. Pattyn 1014

Section IV. Modification of insulators

IVa. Polymers and ceramics

The multi-aspects of ion beam modification of insulators
J. Davenas and P. Thevenard 1021
Transport phenomena in implanted electroactive polymers
A. Moliton, C. Moreau, J.-P. Moliton and G. Froyer 1028
Ion implantation effects in Al_2O_3: hydration and optical absorption
G.W. Arnold 1036
Defect generation and healing in SiC powder subjected to Ar implantation
M. Heuberger, R. Telle and G. Petzow 1040
Heat-induced versus particle-beam-induced chemistry in polyimide
G. Marletta and F. Iacona 1045
Improvement of surface properties of polymers by ion implantation
R. Öchsner, A. Kluge, S. Zechel-Malonn, L. Gong and H. Ryssel 1050
Chemical and energy deposition effects of keV ions on the adhesion of Cu films onto polymers
N. Tegen, J. Wartusch and K.-H. Merkel 1055
RBS study of oxidation processes in polypropylene and polyethylene implanted with fluorine ions
V. Hnatowicz, V. Havránek, J. Kvítek, V. Peřina, V. Švorčík and V. Rybka 1059
Infrared analysis of the irradiation effects in aromatic polyimide films
D. Xu, X.L. Xu, G.D. Du, R. Wang, S.C. Zou and X.H. Liu 1063
Surface modification of polystyrene for improving wettability by ion implantation
Y. Suzuki, M. Kusakabe and M. Iwaki 1067
Electrical and optical investigations of carbon clusters formed in organic films by ion implantation
M. Iizuka, S. Kuniyoshi, K. Kudo and K. Tanaka 1072
Modification of conducting polymers by low energy reactive ion beams and their chemical effects
K.G. Jung, J.W. Schultze and Ch. Buchal 1076
Characterization of Ag- and W-implanted polyimide films
M. Iwaki, K. Yabe, A. Fukuda, H. Watanabe, A. Itoh and M. Takeda 1080
On the influence of low energy tantalum ion implantation on indentation fracture and hardness of α-alumina single crystals
W. Ensinger and R. Nowak 1085
TEM-microstructural investigations of ion beam modified ceramics with respect to their macroscopic properties
W. Fischer, G.K. Wolf, H. Ruoff and K.-H. Katerbau 1091
Ion implantation and ion beam assisted deposition onto cemented tungsten carbide and syalon
L. Guzman, I. Scotoni, A. Miotello, M. Elena and D.C. Kothari 1097

Microstructural characterization of zirconia films produced by the dual ion beam deposition technique
N.K. Huang, J.S. Colligon, H. Kheyrandish and Y.S. Tang 1101
Ion beam induced epitaxial crystallization of sapphire
W. Zhou, D.K. Sood, R.G. Elliman and M.C. Ridgway 1104
Ion irradiation-induced nano-scale polycrystallization of intermetallic and ceramic materials
L.M. Wang, R.C. Birtcher and R.C. Ewing 1109
High energy heavy ion irradiation effects in α-Al_2O_3
B. Canut, S.M.M. Ramos, P. Thevenard, N. Moncoffre, A. Benyagoub, G. Marest, A. Meftah, M. Toulemonde and F. Studer 1114
Ion beam modification of aromatic polymers
S. Shukushima, S. Nishikawa, Y. Matsumoto and Y. Hibino 1119
Electrical conductivity in niobium implanted TiO_2 rutile
S.M.M. Ramos, B. Canut, R. Brenier, L. Gea, L. Romana, M. Brunel and P. Thevenard 1123
Ion beam irradiation effect on solubility of spin-on glass to methanol
J. Yanagisawa, Y.-B. Koh and K. Gamo 1128

IVb. Glasses, High-T_c superconductors and ionic crystals

Waveguides and waveguide lasers fabricated by ion implantation
P.J. Chandler and P.D. Townsend 1135
Processing high-T_c superconductors with GeV heavy ions
A.D. Marwick, L. Civale, L. Krusin-Elbaum, R. Wheeler, J.R. Thompson, T.K. Worthington, M.A. Kirk, Y.R. Sun, H.R. Kerchner and F. Holtzberg 1143
Ion implanted optical waveguides in $KNbO_3$ for efficient blue light second harmonic generation
M. Fleuster, Ch. Buchal, D. Fluck and P. Günter 1150
Composition changes in bombarded oxides and carbides: the distinction between ballistic, chemically guided, and chemically random behavior
R. Kelly, I. Bertóti and A. Miotello 1154
Irradiation experiments on HTSC thin films
T. Kroener, G. Linker, O. Meyer, B. Strehlau and S. Massing 1164
XPS studies on the charge states of Cr and Cu atoms implanted into α-Al_2O_3 and MgO single crystals
T. Futagami, Y. Aoki, O. Yoda, S. Nagai and D.M. Rück 1168
Modification of the optical spectra of glass by metal ion implantation
X.Y. Yao, P.B. Fojas, I.G. Brown and M.D. Rubin 1171
Quantitative investigations of the removal of glass material by low energy ion beams with the use of optical interferometry
M. Weiser 1174
Hydrogen assisted crystallisation of strontium titanate
T.W. Simpson and I.V. Mitchell 1178
Ion-implanted optical waveguides in zinc tungstate
M.J. Rodman, P.J. Chandler and P.D. Townsend 1182
Incorporation of Nd implanted in strontiumtitanate studied with photoluminescence
M.G. Tenner, Y.A.R.R. Kessener and M.H.F. Overwijk 1185
Zirconium implantation into oxygen implanted iron
J. Takahashi, K. Terashima and M. Iwaki 1189
Substrate effects in silver-implanted glasses
P. Mazzoldi, L. Tramontin, A. Boscolo-Boscoletto, G. Battaglin and G.W. Arnold 1192
Suppression of charge-up on the surface of glass during ion implantation by a large scale ion source
Y. Andoh 1197

Formation of conductive layers on dielectric substrates by ion bombardment
V.F. Pichugin, T.S. Frangulian, Yu.Yu. Kryuchkov, A.N. Feodorov and A.I. Riabchikov 1203
Spectroscopic analysis of proton induced fluorescence from cerium doped yttrium aluminum garnet
J.H. Fisher, W.A. Hollerman, G.A. Shelby, L.R. Holland and G.M. Jenkins 1207
Plastic flow induced by ionization processes in ion-damaged MgO
R. Brenier, B. Canut, L. Gea, S.M.M. Ramos, P. Thevenard, J. Rankin, L. Romana and L.A. Boatner 1210
Effects of implantation dose on the inhomogeneous broadening of zero phonon lines in LiF
G.S. Blieden, J.D. Comins and T.E. Derry 1215
Response of oxides to ion bombardment: the difference between inert and reactive ions
I. Bertóti, R. Kelly, M. Mohai and A. Tóth 1219
Radiation damage in Tb-implanted CaF_2 observed by channeling and luminescence measurements
K. Aono, M. Kumagai, M. Iwaki, Y. Aoyagi and S. Namba 1226
Ion synthesis in coatings on glasses
A. Deshkovskaya, V. Yanishevskii, S. Gritsai, L. Lynkov, I. Skornyakov and V. Soloviev 1230
Anomalous fringe pattern of Ag colloid in phosphate glasses by implantation
N. Matsunami and H. Hosono 1233
On the nature and efficiency of colouration of MgF_2 crystals by 100 keV ions
A.T. Davidson, A.M.J. Raphuthi, J.D. Comins and T.E. Derry 1237
Study of Fe : Al_2O_3 ion beam sputtered thin films with various iron contents
F. Thimon, G. Marest, N. Moncoffre, S. Joshi and S.B. Ogale 1241
Ion beam modification of $Gd_2Ti_2O_7$
W.J. Weber and N.J. Hess 1245
Structural modifications of yttrium iron garnet after high-energy heavy ion irradiations
J.M. Costantini, F. Ravel, F. Brisard, M. Caput and C. Cluzeau 1249
Radiation damage and flux pinning in high temperature superconductors
J.R. Liu, J. Kulik, Y.J. Zhao and W.K. Chu 1255
Radiation defects in the oxygen sublattice of UO_2 single crystals
A. Turos, Hj. Matzke, M. Wielunski and L. Nowicki 1259
Surface morphology changes in ion implanted chalcogenide films after annealing
T. Tsvetkova, S. Balabanov, B. Amov, A. Djakov and I.H. Wilson 1264

Section V. Novel techniques

Va. Ion beam mixing, adhesion, focussed ion beams

Focused ion beam lithography
J. Melngailis 1271
Plasma synthesis of metallic and composite thin films with atomically mixed substrate bonding
I.G. Brown, A. Anders, S. Anders, M.R. Dickinson, I.C. Ivanov, R.A. MacGill, X.Y. Yao and K.-M. Yu 1281
Energy spread of a focused ion beam system with a supertip
Th. Maisch, Ch. Wilbertz, Th. Miller and S. Kalbitzer 1288
Maskless fabrication of contact vias by focused MeV heavy ion beam
Y. Mokuno, Y. Horino, A. Kinomura, A. Chayahara, M. Kiuchi, S. Tamura, K. Fujii and M. Takai 1292
Stitching Al films on SiO_2 substrates by Al ion implantation
X.W. Su, Q.Y. Zhang, S. Jin, R. Wang, W.D. Shi, G.B. Li, G.B. Zhang and T.C. Ma 1296
Interfacial properties of ion beam mixed Cu/SiO_2 system
K.S. Kim, I.S. Choi, Y.S. Lee, Y.W. Kim, S.S. Kim, H.K. Kim, D.W. Moon and C.N. Whang .. 1300
Adhesion enhancement of metallized thin films on alumina ceramics by ion beam mixing
H. Hasuyama, Y. Shima, N. Hayashi, I. Sakamoto, K. Baba and M. Motoyama 1304

Development of a crack gauge by using ion beam mixing
S. Ohno, N. Shigenaka, M. Fuse and H. Ibe 1308
Properties of $ErBa_2Cu_3O_{7-x}$ thin films formed by ionized cluster beam deposition at low pressure
A. Shuhara, N. Ritoh, T. Takagi, E. Haraguchi, S. Terai and A. Ryohman 1313
Thermal behavior study of Sb implanted into photoresist film
R.L. Maltez, L. Amaral, M. Behar and F.C. Zawislak 1316
Thin films from energetic cluster impact; experiment and molecular dynamics simulations
H. Haberland, Z. Insepov, M. Karrais, M. Mall, M. Moseler and Y. Thurner 1320
Focused-ion-beam-induced tungsten deposition: theory and experiment
M.H.F. Overwijk and F.C. van den Heuvel 1324
Transferring Gus gene into intact rice cells by low energy ion beam
Yu Zengliang, Yang Jianbo, Wu Yuejin, Cheng Beijiu, He Jianjun and Huo Yuping 1328
Effects of H-implantation on the optical stability under photo-irradiation of urushi films
K. Awazu, Y. Nishimura, T. Ichikawa, M. Sakamoto, H. Watanabe and M. Iwaki 1332
High-intensity ionized cluster beams for surface modification: deposition and erosion
J. Gspann 1336

Vb. Ion beam assisted deposition and etching

Advantages of dynamic ion beam mixing
M. Kiuchi 1343
Effects of Ar ion beam bombardment on the formation of cubic BN in IBED
N. Tanabe and M. Iwaki 1349
Synthesis and properties of microlaminate structures by ion beam assisted deposition
G.S. Was, J.W. Jones, C.E. Kalnas, L.J. Parfitt, A. Mashayekhi and D.W. Hoffman 1356
Electrical characterization of MOS structures fabricated on SF_6 and $SF_6 + C_2ClF_5$ reactive ion etched silicon
E. Castán, J. Vicente, J. Barbolla, E. Cabruja and E. Lora-Tamayo 1362
Etching rate modification in silicon oxide by ion implantation and rapid thermal annealing
C. Domínguez, B. Garrido, J. Montserrat, J.R. Morante and J. Samitier 1367
Surface morphology and epitaxy of β-$FeSi_2$ obtained by ion beam assisted growth
S. Ravesi, A. Terrasi and A. La Mantia 1371
Basic characteristics of chromium nitride films by dynamic ion beam mixing
K. Sugiyama, K. Hayashi, J. Sasaki, O. Ichiko and Y. Hashiguchi 1376
The properties of titanium nitride prepared by dynamic ion mixing
H. Nagasaka, N. Tsuchiya, M. Kiuchi, A. Chayahara, K. Fujii and M. Satou 1380
First stages study of high energy ion beam assisted deposition
J.C. Arnault, J. Delafond, C. Templier, J. Chaumont and O. Enea 1384
Low temperature fabrication of ceramic film by ICVD method using ion beam
S. Kiyama, H. Hirano, Y. Domoto, K. Kuramoto, R. Suzuki and M. Osumi 1388
IBAD growing of magnetic iron nitride thin films
R. Hübler, S.R. Teixeira, W.H. Schreiner and I.J.R. Baumvol 1392
The effects of deposition temperature and interlayer thickness on the adhesion of ion-assisted titanium nitride films produced with yttrium metal interlayers
A.M. Jones, A.R. McCabe, S.J. Bull and G. Dearnaley 1397
Titanium nitride film formation by the dynamic ion beam mixing method
Y. Nakagawa, S. Ohtani, T. Nakata, M. Mikoda and T. Takagi 1402
Titanium oxide films prepared by dynamic ion mixing
Y. Setsuhara, H. Aoki, S. Miyake, A. Chayahara and M. Satou 1406
Microstructural investigations on titanium nitride films formed by medium energy ion beam assisted deposition
W. Ensinger and B. Rauschenbach 1409

Ion beam mixing of Al–AlN multilayers for tribological and corrosion protection
R. Hübler, G.K. Wolf, W.H. Schreiner and I.J.R. Baumvol 1415
Ion implantation assisted epitaxial alignment of oxide thin films prepared by spin-coating of liquid precursors
G. Braunstein and G.R. Paz-Pujalt 1419
Synthesis of aluminum oxide thin films by ion beam and vapor deposition technology
K. Ogata, K. Yamaguchi, S. Kiyama, H. Hirano, S. Shimizu, M. Kohata, T. Miyano, Y. Setsuhara and S. Miyake 1423
Role of ion beam energy for crystalline growth of thin films
K. Ogata, Y. Andoh and F. Fujimoto 1427

Vc. Diamond, carbon, and related materials

Ion beam modification and dopant activation in diamond
J.F. Prins 1433
Adherence of diamondlike carbon coatings on total joint substrate materials
J. Lankford, C.R. Blanchard, C.M. Agrawal, D.M. Micallef, G. Dearnaley and A.R. McCabe . . 1441
Radiation damage study of polycrystalline CVD and natural type IIA diamonds using Raman and photoluminescence spectroscopies
S. Han, S.G. Prussin, J.W. Ager III, L.S. Pan, D.R. Kania, S.M. Lane and R.S. Wagner 1446
The effect of carbon and nitrogen implantation on the abrasion resistance of type IIa (110) diamond
G.C. Anderson, S. Prawer, P. Johnston and D. McCulloch 1451
Doping of fullerenes by ion implantation
J. Kastner, H. Kuzmany, L. Palmetshofer, P. Bauer and G. Stingeder 1456
Structural and chemical bonding investigation of tungsten implanted glassy carbon
D. McCulloch, A. Hoffman, P.J. Evans and S. Prawer 1460
Characterization of hard amorphous carbon films implanted with nitrogen ions
F.L. Freire Jr., C.A. Achete, D.F. Franceschini, C. Gatts and G. Mariotto 1464
Dynamics of B sublimation from boron doped graphite USB15
R. Schwörer, C. García-Rosales and J. Roth 1468
Modification of interfacial characteristics between diamondlike carbon films and substrates by using ion bombardment
J.-P. Hirvonen, J. Koskinen, I. Koponen, J. Likonen and H. Kattelus 1472
X-ray diffraction studies of self-ion irradiated synthetic single crystal diamond
H. Maeta, K. Haruna, Lu Bang and F. Ono 1477
Cross-sectional transmission electron microscopy investigation of xenon irradiated glassy carbon
D. McCulloch, S. Prawer, A. Hoffman and D.K. Sood 1480
The synthesis and properties of BN films prepared by ion irradiation and vapor deposition
S. Nishiyama, N. Kuratani, A. Ebe and K. Ogata 1485
Structural characterization of ion implanted HOPG and glass-like carbon by laser Raman spectroscopy
H. Watanabe, K. Takahashi and M. Iwaki 1489
Fluorine implantation-induced ESR splitting in a-C:H thin films
S.P. Wong, S. Peng, N. Ke and P. Li 1494
Use of ion implantation for improving the adhesion of diamond-like carbon films deposited by means of other techniques
J.C. Pivin, T.J. Lee, J.H. You, H. Park, F. Davanloo, C.B. Collins, P. Catania, Y. Sampeur and H. Bernas 1499
Tribological evaluation of hydrogen-free ion beam deposited diamondlike carbon coatings
G.D. Lempert, Y. Lifshitz, S. Rotter, A.J. Armini and S. Bunker 1502

Ion stimulated densification of amorphous carbon films
J. Ullmann, G.K. Wolf and W. Möller 1507

Author index 1511